Getting Glass Out:
Bottle Bills and Other Methods

Washington Recycling Coordinators Meeting
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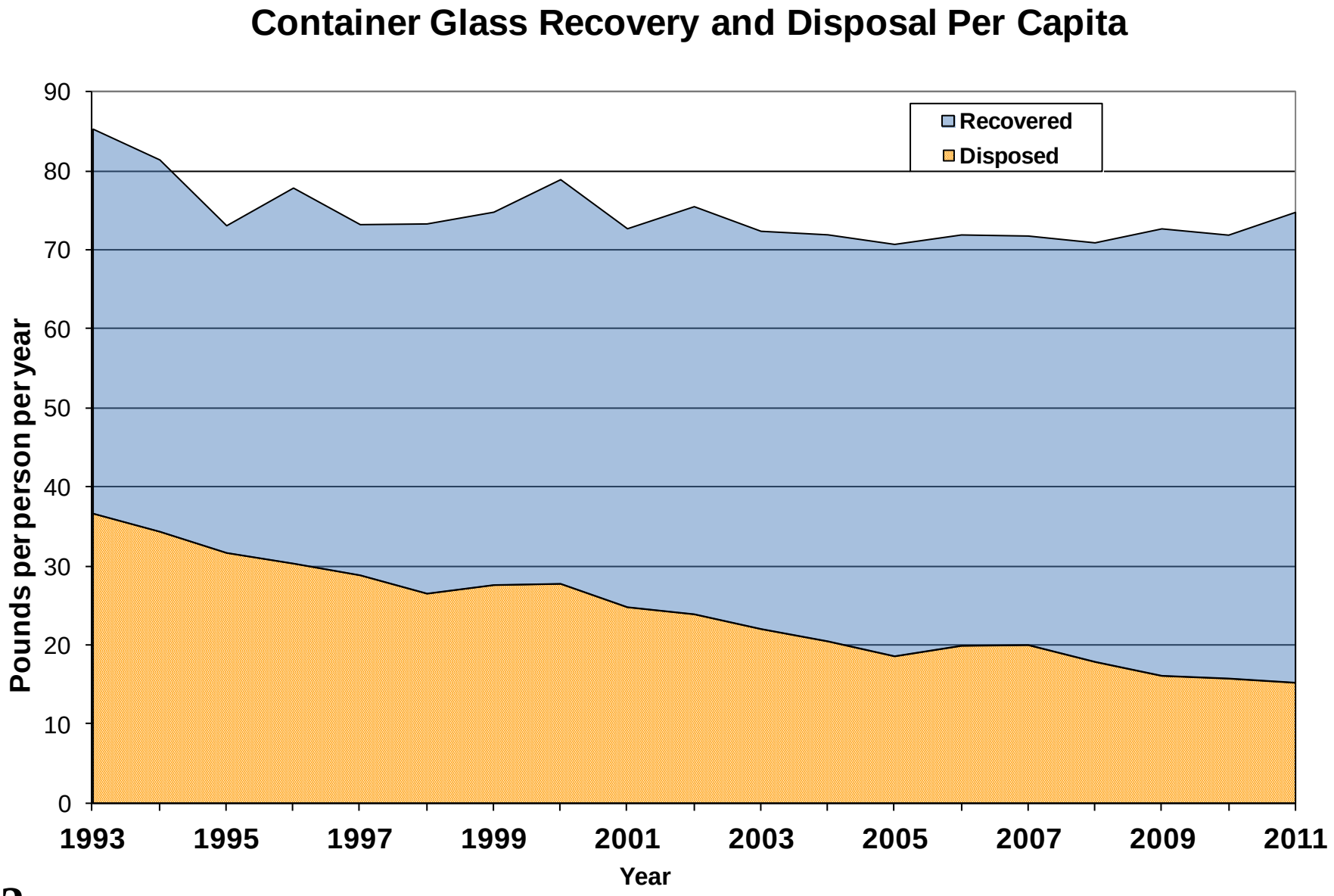
Bottle Bills and Curbside Glass



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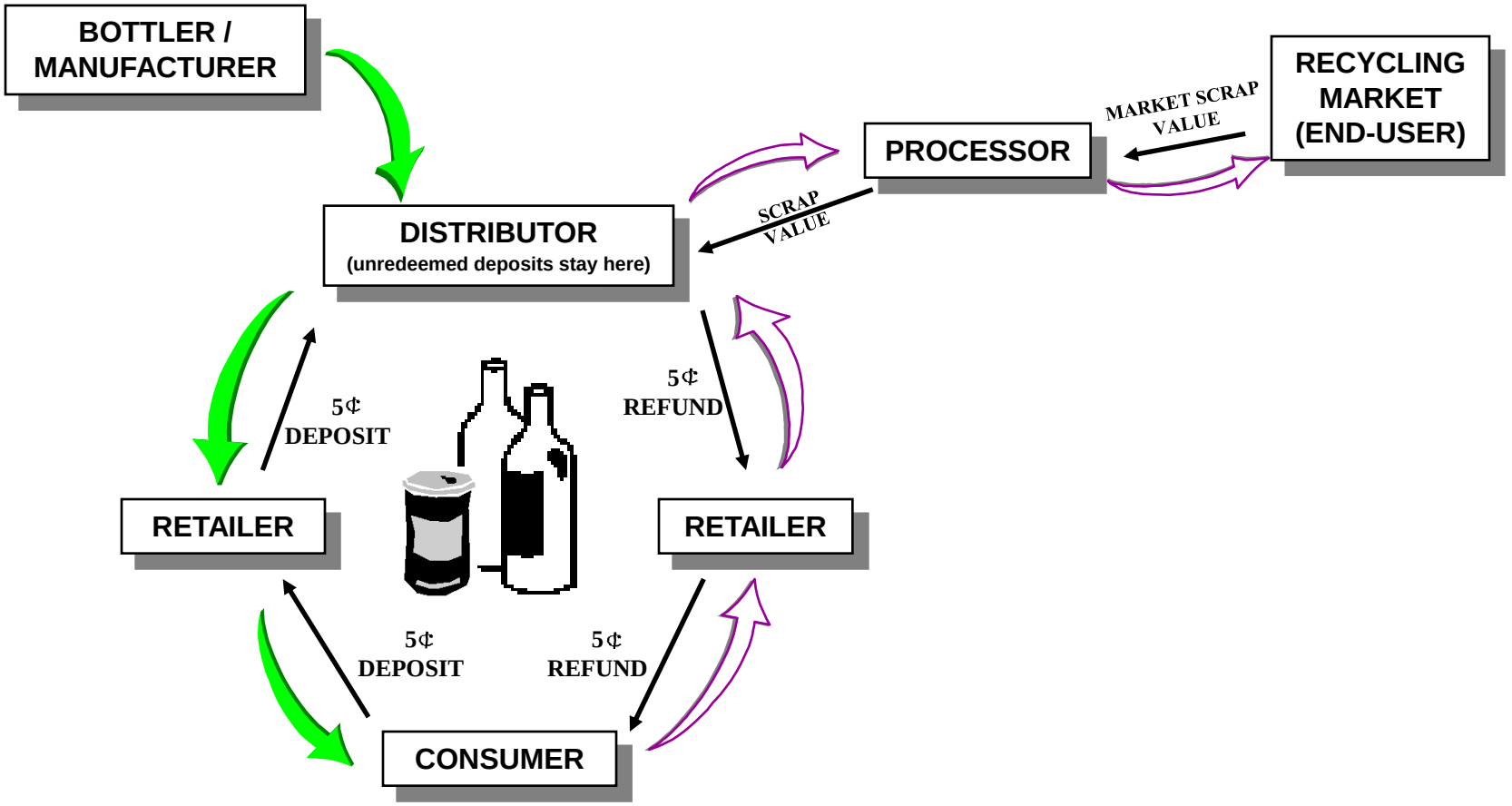


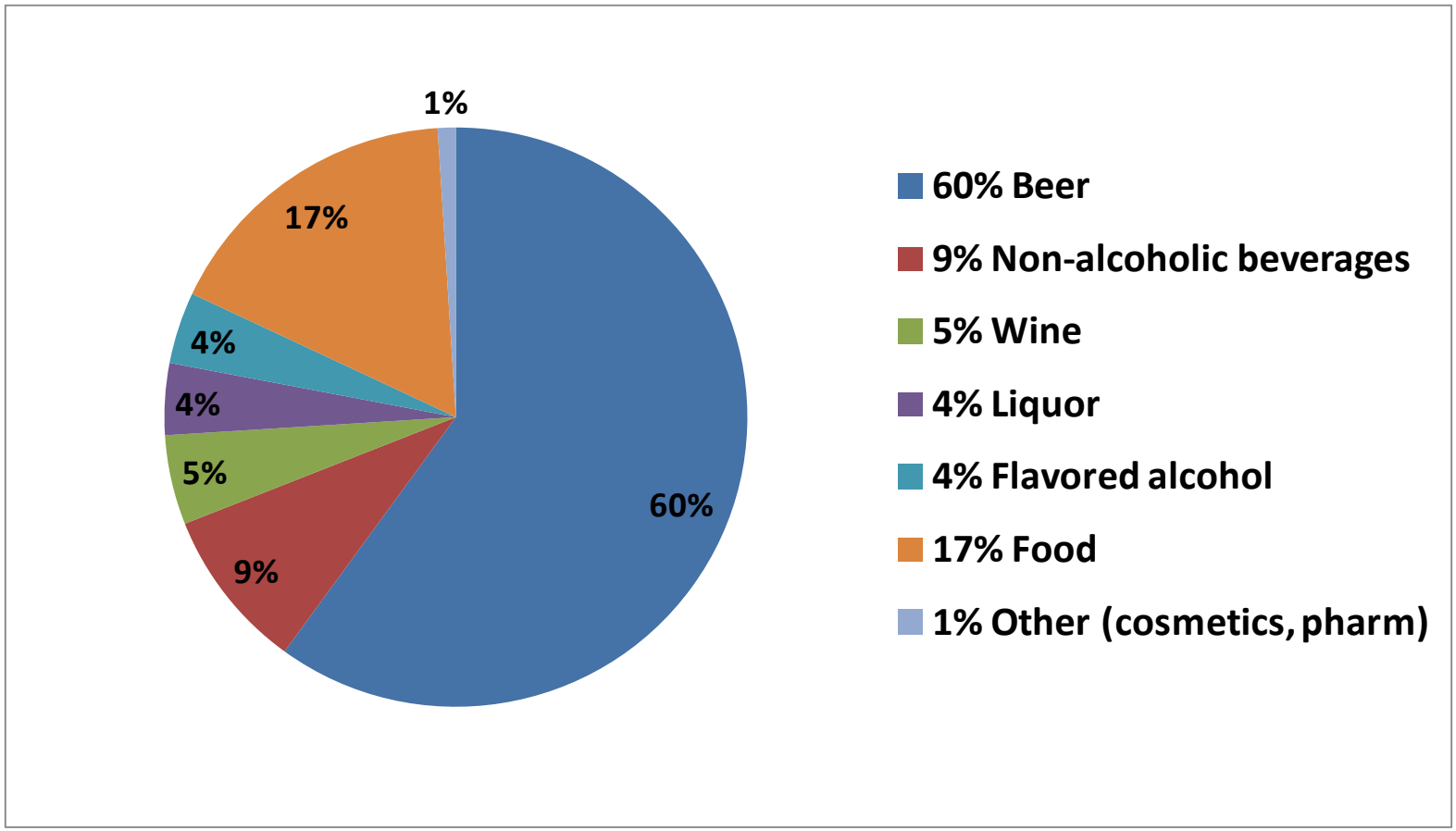
Disposal and Recycling of Glass Beverage Containers

Non Deposit Containers	Disposed 2002 (Millions)	Disposed 2009 (Millions)	Recycled (not redeemed) 2004 (millions)	Redeemed for deposit 2004 (millions)	Total 2002 - 2004
Glass Beer & Soft Drink	34.49	27.07	12.53	201.39	248.41
Glass Milk	0.02	0.08	0.01		0.03
Glass Juice/Tea/Sports/ot	26.53	10.58	11.58		38.11
Glass Water	0.42	0.14	0.01		0.43
Glass Liquor	6.98	6.70	5.73		12.72
Glass Wine	11.07	10.81	24.63		35.71
Glass Wine Cooler	0.10	0.00	0.08		0.18

Disposal by Weight 2009: Percent of total disposed waste

Deposit glass bottles	0.27%
No-deposit glass bottles	0.55%
Other container glass	0.35%

2008 U.S. Glass Container Shipments By Category (percent by count)



82% of glass container shipments are for beverages

Source: US Department of Commerce, Bureau of Census

Glass Redemption Rates: West Coast Bottle Bills

Oregon Glass 2012	78.45%
Oregon All Deposit Containers 2012	70.95%
British Columbia Glass 2009	92.84%
Alberta Glass 2009	94.41%
California Glass 2012*	84.10%
California Glass 2009*	80.46%
California Glass Without Curbside 2009	64.37%

* includes curbside glass

Commingled Recycling Composition

Contamination levels of inbound commingled materials:

2.0% Paper not recyclable at the curb

- Paper towel, freezer boxes, cigarette packs, cups, fast food items, mixed paper/materials.

2.9% Plastic not recyclable at the curb

- 1.0% film (includes some intended for recycling)
- 1.9% rigid plastics

1.0% Glass (may be underestimated)

0.3% Large metal items

1.2% Bagged garbage

2.0% Other nonrecyclables

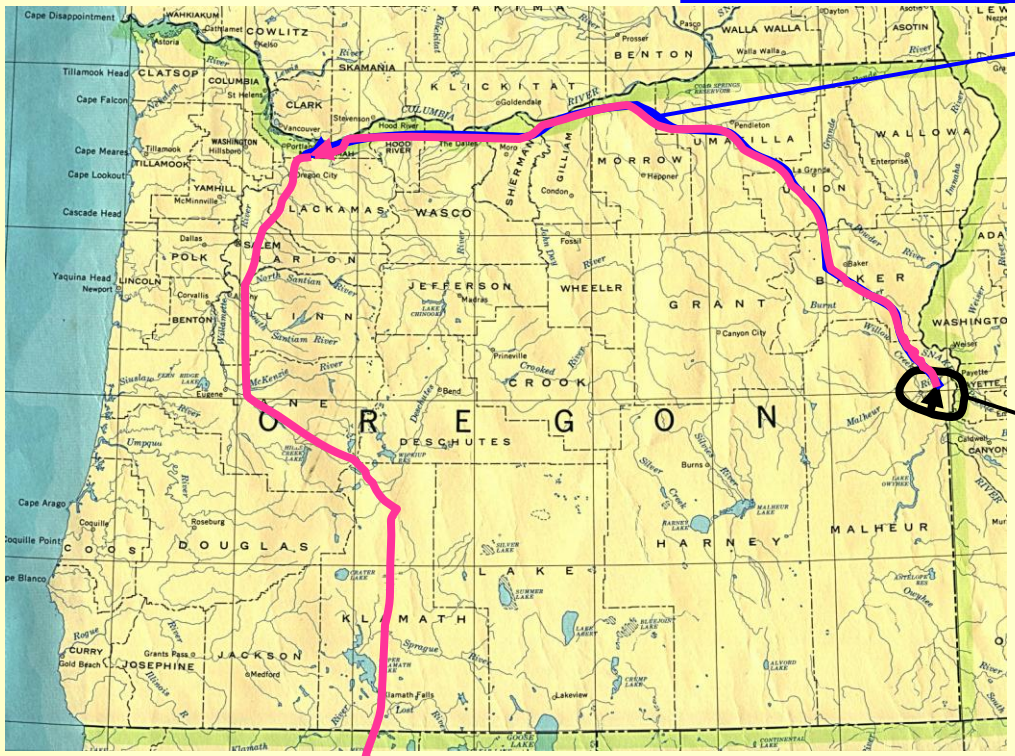
Source: DEQ commingled recycling study 2009/2010

Energy Savings from Recycling (EPA)

Material	MMBTU/Ton
Glass (to glass)	2.1
Plastic Containers	52.4
Cardboard	15.4
Aluminum	206.4

End Markets Matter! (sometimes)

Cullet to Bottle Recycling (Portland)
Net Energy Savings: ~2.1 MMBTU/ton



Cullet to Aggregate Recycling (Local)
Net Energy Savings: ~0.2 MMBTU/ton

Cullet to Fiberglass Recycling (California)
Net Energy Savings: ~2.1-3.2 MMBTU/ton

Glass: Curbside loss to low-grade uses

- Policy to allow glass to be used in landfill road beds
  - Was supposed to apply to facilities distant from glass plant
  - Much Metro area glass ending up as aggregate (Hillsboro LF)
  - Most (not all) haulers stopped color-sorting glass. Owens Illinois requires recycled glass to be color-sorted.
  - Strategic Materials charged $18/ton to take glass from Portland to California for color-sort / recycling

Glass end-use by collector type

Bottle Bill distributors

	Glass	Aggregate	Total	% Aggregate
2010	55,796	506	56,302	0.9%
2009	55,164	326	55,490	0.6%
2005	55,556	631	56,187	1.1%

Curbside and other collectors

	Glass	Aggregate	Total	% Aggregate
2010	27,788	23,740	51,528	46.1%
2009	35,864	16,725	52,588	31.8%
2005	28,651	9,832	38,483	25.5%

Glass: New processing capacity in future

- e-Cullet establishing Portland glass processing plant
  - Owens Illinois and e-Cullet have announced and agreement
  - e-Cullet hopes to have plant in Portland fully operational by December 2013
  - Not publicly announcing pricing, but should be better than charging $18/ton. May pay for good quality color-mixed glass.

Oregon Glass Curbside Collection Programs

	Cities required	All Cities	All Population	Percent Population (2011)
Glass collected separately	60	97	2,655,955	68.9%
Glass collected in commingled	5	10	121,516	3.2%
Glass at depot or no glass collection	17	46	328,669	8.5%
No curbside	5* (Alternative programs)	89	748,987	19.4%

eCullet – what they can recover of glass from different sources with optical sorting

(Source: AOR 2012 Presentation)

Glass Recycling Collection Programs

A. Bottle Bill Color Sorted Glass	95% to 97%
B. Bottle Bill Three Color Mixed Glass	80% to 85%
C. Drop off centers, Manned, Color Sorted	95% to 97%
D. Drop off centers Unmanned, Color Mixed	70% to 75%
E. Duel Stream Collection, Not processed through a MF	70% to 75%
F. Single Stream Collection, processed through a MRF	50% to 65%

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Privileged and Confidential Information

eCullet

Losses of Glass at MRF and at Processor

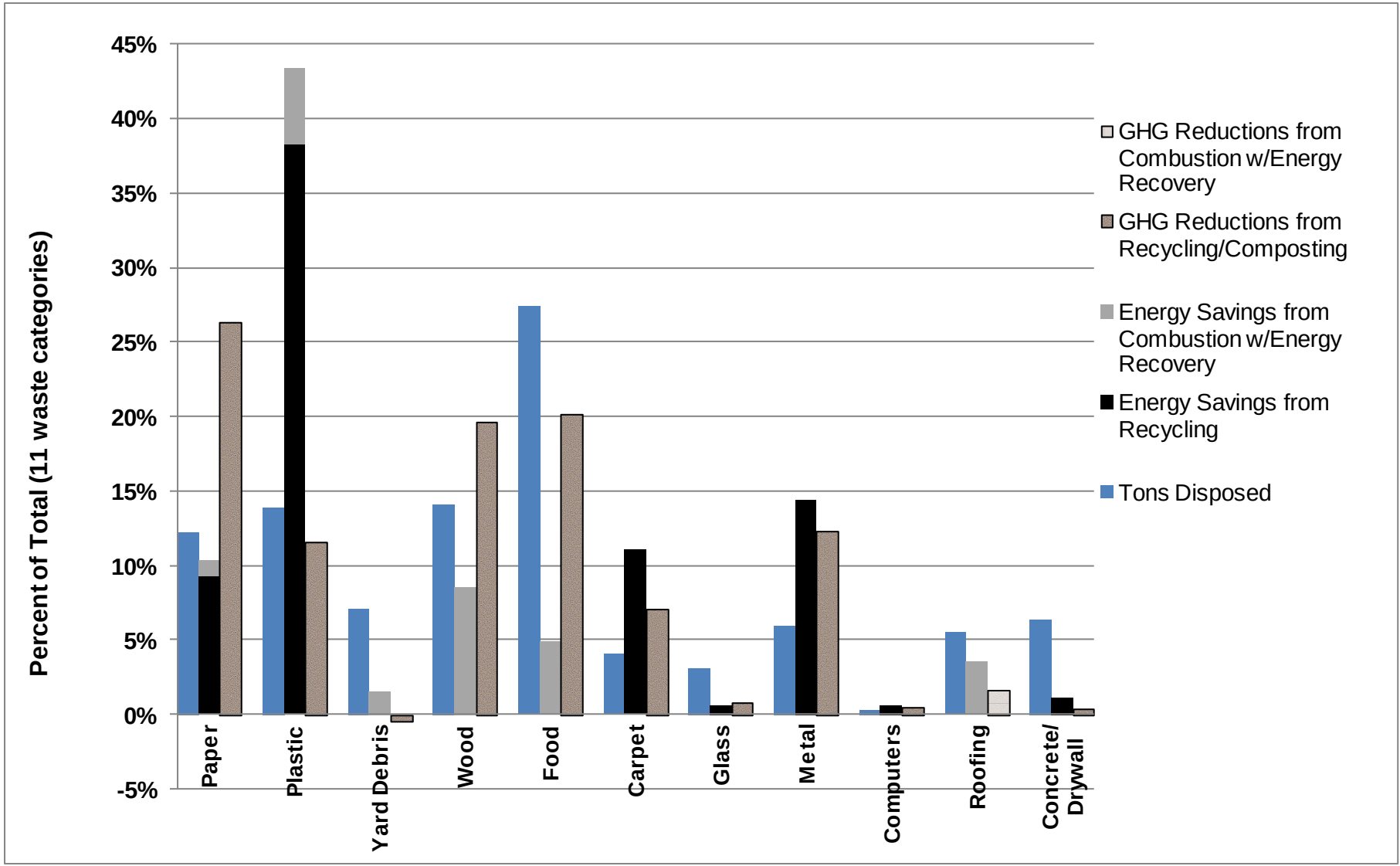
- The more the glass breaks, the greater the loss.
- Some glass goes out in other commodities
- Some goes to landfill with fines and other garbage

Overall, combining the MRF and optical sorting of glass in single-stream: *

- ~ 40% can be recovered for glass bottles or fiberglass
- ~ 20% is very small broken pieces that can only be used for low-end applications (aggregate)
- ~ 40 is too small and contaminated and ends up in landfills

* Source: Understanding Environmental and Economic Impacts of Single Stream Recycling. Clarissa Morawski, CM Consulting December 2009)

Oregon Disposed Waste – by tons and by potential energy and greenhouse gas savings



Glass Going Out from MRF in Other Commodities: DEQ Commingled Recycling Study

Material Commodity==>	ONP	OCC	Other Paper	Rigid Plastic	Aluminum	Tin Cans	Scrap Metal	Glass/ Film/ Garbage
Newspaper-compatible paper	86.71%	3.30%	16.60%	0.88%	0.95%	1.05%	0.69%	13.14%
Corrugated Cardboard/brown paper	2.66%	83.75%	23.64%	0.07%	0.29%	0.09%	0.05%	2.70%
Paper not ONP-compatible (bleached)	3.87%	0.66%	3.00%	0.01%	0.01%	0.03%	0.00%	0.23%
Paper not ONP-compatible (unbleached)	3.26%	9.67%	33.29%	0.07%	0.04%	0.06%	0.02%	1.65%
Gable Top Beverage Carton	0.15%	0.12%	16.08%	0.01%	0.06%	0.01%	0.00%	0.22%
Aseptic Drink Cartons	0.01%	0.01%	2.58%	0.00%	0.01%	0.00%	0.00%	0.02%
*Non-recyclable paper	0.66%	1.60%	3.12%	0.97%	0.17%	1.42%	0.04%	3.60%
Plastic bottles & tubs curbside OK	0.90%	0.26%	0.51%	84.24%	0.90%	0.78%	0.08%	1.16%
*Film Plastic	0.25%	0.11%	0.08%	0.09%	0.18%	0.18%	0.07%	10.07%
*Other plastic not acceptable at curb	0.59%	0.26%	0.23%	12.31%	0.35%	0.73%	0.81%	8.12%
*Glass	0.04%	0.00%	0.04%	0.07%	0.26%	0.02%	0.00%	29.34%
Aluminum beverage cans	0.13%	0.03%	0.10%	0.06%	79.45%	0.34%	0.01%	0.13%
Aluminum foil/pet cans	0.08%	0.00%	0.06%	0.02%	14.60%	0.15%	0.84%	0.27%
Steel/tinned cans	0.36%	0.06%	0.31%	0.18%	2.15%	91.82%	2.20%	1.26%
Other scrap metal& aluminum	0.10%	0.01%	0.08%	0.02%	0.30%	2.91%	93.63%	1.52%
*hazardous materials	0.00%	0.00%	0.00%	0.06%	0.00%	0.13%	0.39%	0.10%
*other nonrecyclables	0.24%	0.15%	0.27%	0.94%	0.28%	0.29%	1.15%	26.49%
Total	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Number of samples	88	22	9	43	10	11	10	68

Glass Quantity by Supplier: NORPAC Mill 2009

Source	% Glass Content	% of NORPAC fiber supply	Tons of glass per month
1) Glass in mix	1.50%	13%	20
2) Glass in mix	0.66%	5%	3
3) Glass on side	0.14%	30%	4
4) Glass in mix	0.78%	5%	4
5) Bottle Bill (glass on side)	0.08%	8%	0.6
6) Glass in mix	0.35%	15%	5
Total	**0.46%**	**76%**	**37**

Source: Beyond the Curb – Tracking the Commingled Residential Recyclables from Southwest Washington. Washington Department of Ecology

Summary: Oregon DEQ Concerns with Glass in Commingled Recyclables

- Loss of most of the glass to disposal or aggregate
- Contamination of other material
- Damage to equipment
- Risk to sorter safety
- Loss of other materials because of extra cleaning needed to remove glass
- Shifting of paper from local mills to foreign markets
- Citizen expectation that all their glass should be recycled
- State law prohibits disposal of source-separated recyclables

Combination of bottle bill and keeping glass separate have both lead to cleaner recyclables

Bottle Bills and Curbside Glass

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